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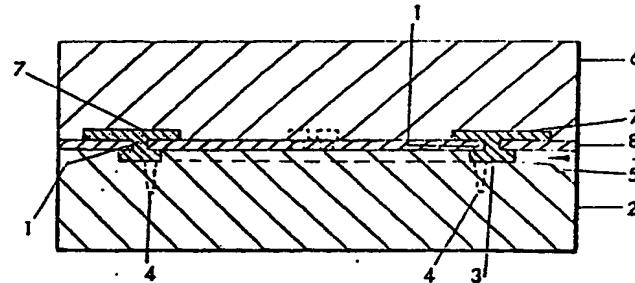
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(71) Applicants  
Shortland Bowen  
Instruments Limited,  
Hove Park Villas, Hove,  
East Sussex, BN3 6HP  
(72) Inventor  
Barrie Howell Bowen  
(74) Agents  
G. F. Redfern & Company

## (54) Method of forming raised figures on a dial plate

(57) The invention provides a method of forming raised characters on a dial plate 8. A hole 1 is produced in the dial plate 8 at the desired location of each character, and the dial plate is then prefinished. To form the characters, the dial plate is placed in a mould, one half 6 of which is formed with a plurality of cavities 7 each in the shape of one of the desired characters. The other half 2 of the mould is provided with a channel 3 which follows a path corresponding to the various character cavities. The dial

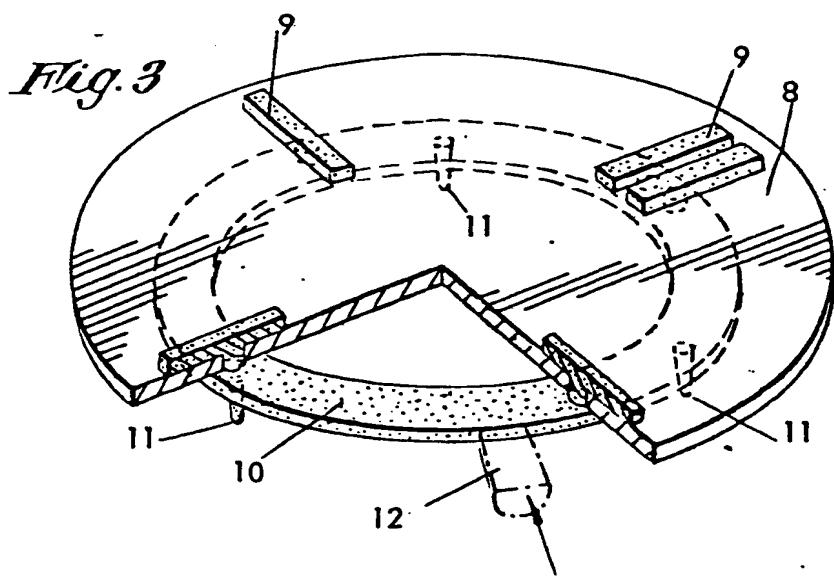
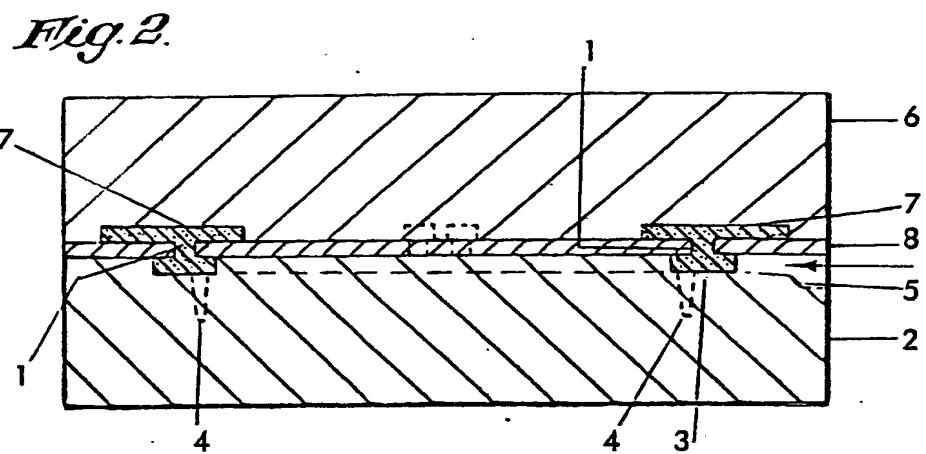
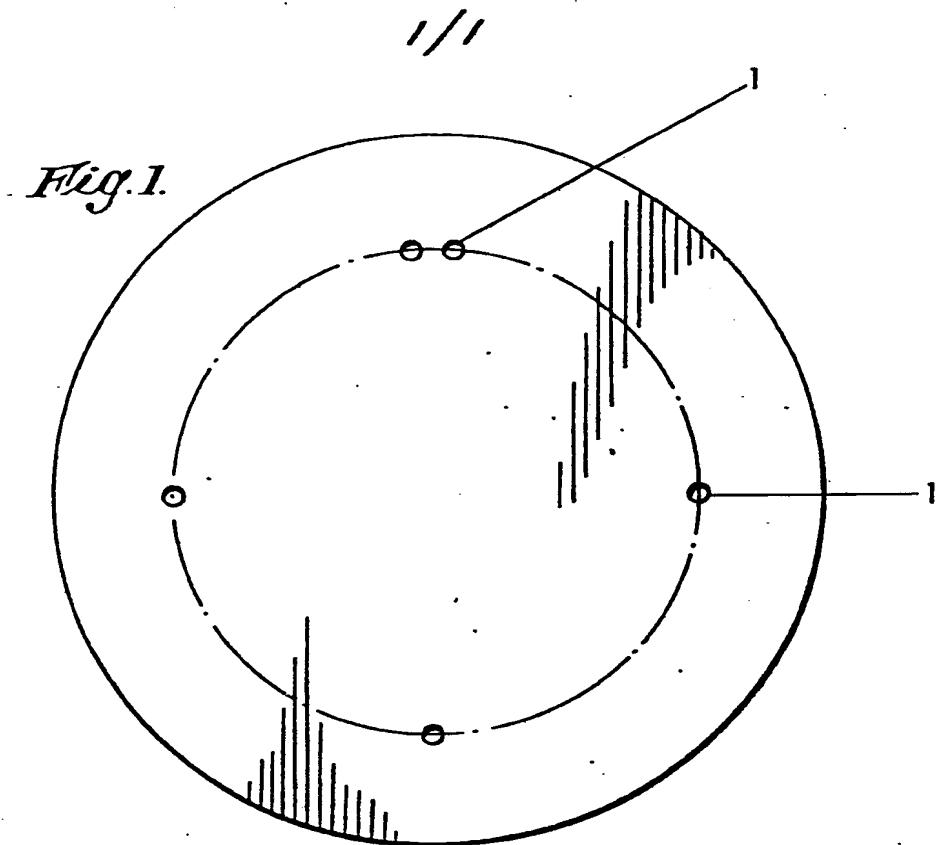
plate is placed in the mould with the holes in register with the channel and the respective cavities, and synthetic resin material is injected into the channel and hence through the holes into the various character cavities. When the dial plate is removed from the mould, it will be found that the synthetic resin characters have been formed on one side of the plate, and a ring, or the like, corresponding to the channel has been formed on the other side of the plate. The characters are joined to the ring by synthetic resin material extending through the various holes in the plate.

*Fig. 2.*



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**SPECIFICATION****Improvements in or relating to methods of forming raised figures on dial plates**

This invention relates to methods of forming raised characters on instrument dial plates, and decorative and indicator panels where the characters are to be of contrasting material and finish to the substrate plate or panel. It is an object of the invention to provide a method which is simpler, more effective and cheaper than those used at present.

The invention is particularly applicable to instrument dials where apparently mechanically unconnected solid characters or figures must be located and adhered or fixed to a panel in a predetermined juxtaposition to each other.

An example of such an application is the production of time-of-day clock dials or faces and the term "characters" is used herein to include chapters, letters, symbols, numerals, logos and decorations.

Most present methods for forming raised characters involve separate manufacture of each character, for example, by moulding, milling, or stamping, and each character is subsequently fixed to the plate or panel by one of the following processes:

1. The plate or panel is pre-pierced so that bosses, pins or spigots on the rear of the characters will pass through the holes and protrude sufficiently to be able to be heat-sealed, riveted, or nutted with conventional threaded nuts, proprietary spring press nuts, screws or simply to locate the character whilst glue or dry adhesive is used as the fixing medium at the interface. Alternatively glue could be applied about the spigot protrusion through the panel.

The position of the holes in the panel and the position of the pins or spigots on the characters have to be arranged to be secret or unobtrusive and in prescribed positions as to guarantee the desired final orientation and juxtaposition of each character with a reference point and with respect to each other.

2. An alternative method for location and fixing is to use location plates to temporarily retain all characters in the reverse of their juxtaposition as when viewed from their rear faces. The characters then have adhesive applied and the dial plate or panel is lowered face down onto the rear faces of the characters in some convenient and simple single location under pressure whilst the adhesive creates its bond.

3. Another method is to locate characters by skilled eyesight judgement also using adhesive methods of bonding. Such methods are nowadays discounted owing to time and cost.

4. A different method of achieving raised figuring is the embossing technique which is too costly and does not achieve the aim of sharply defined characters of contrasting material.

The invention consists in a method of forming raised characters on a dial plate, wherein a hole is produced in the dial plate at the location of each

65 character, wherein the dial plate is placed in a mould having a plurality of cavities, each in the shape of a respective one of said characters, with one of said holes in register with each cavity, and wherein synthetic resin material is injected through each of said holes into the respective cavity.

70 All characters can be moulded simultaneously in the prescribed attitude and juxtaposed by pre-forming with conventional tool-making techniques the female form of each character in

75 one mould plate. In operation each character cavity of the mould would be fed with molten plastic from a runner or feed in the opposite mould plate such that it passes over each character cavity subsequently filling each cavity.

80 When removed from the mould the dial plate — which will have had its paint or surface finishes pre-applied — will now have facsimile raised characters in a suitable thermo-plastic material faithfully reproduced and accurately positioned and fixed without the need for manual operative skill or excessive assembly time.

85 The characters can be of a wide range of thermo-plastic materials that best suit the final decorative appearance and finish as desired to be applied simultaneously to all characters.

90 It is also recognised that each character can be of identical height for certain coating finishes such as hot foil stamping, roller coating, or lining for grained effect.

95 In addition differential heights could be produced in different areas to derive contrasting finishes or colours by the above coating methods.

The prime advantage of the invention is the simultaneous apparent application of as many characters as desired to one pre-finished plate without manual assembly and risk of damage to the dial plate and with the option of applying a finish coating to all characters simultaneously.

One method of performing the invention will 105 now be described with reference to the accompanying diagrammatic drawings, in which:

Figure 1 is a plan view of a pre-finished dial plate to which characters are to be attached;

110 Figure 2 is a sectional side view of a mould for use in a method in accordance with the invention; and

Figure 3 is a perspective view (partly cut away) of the dial plate after it has been removed from the mould.

115 The dial plate illustrated in Figure 1 consists of metal and is produced by stamping out of a metal strip. A series of holes 1 are pierced in the plate during the stamping process. The number of holes

120 pierced in the plate corresponds to the number of characters to be formed on the plate. Only five holes are shown in Figure 1, but, in the case of a clock dial, there would, of course, be one or more holes provided for each of the twelve hour positions.

125 If a character is in one piece only a single hole will be required at the respective position, but, if the character consists of two or more parts, a corresponding number of holes will be required at the position. In the present

instance, for example, two holes are shown at the 12 o'clock position, and single holes are shown at the 3 o'clock, 6 o'clock, and 9 o'clock positions.

After the plate has been stamped, the required

5 finish is applied to one or both surfaces thereof, for example, by painting, anodising or other surface treatment.

10 The pre-finished plate is then placed in a two-part mould as illustrated in Figure 2. The lower part 2 of this mould is provided with an annular cavity 3, a plurality of recesses 4, and an injection passage 5. The upper part 6 of the mould is provided with a plurality of recesses 7 which correspond to the characters to be formed on the face of the dial plate. The dial plate 8 is inserted in the mould between the upper and lower parts with each of the holes 1 in register with the annular cavity 3 and a respective one of the recesses 7.

15 The mould is then closed and held closed by means not shown. Synthetic resin material is injected through the passage 5. The injected material travels round the annular cavity 3 and enters the recesses 4. It also passes through the holes 1 and enters the recesses 7. The two parts 20 of the mould are arranged to be sufficiently tightly closed to prevent the injected material from escaping from the cavity and the recesses, but not so tightly closed that air cannot escape from the recesses and the cavity as the injected material is forced in.

25 After the injected material has set, the mould is opened, and the plate 8 is removed. As shown in Figure 3, characters 9 have been formed on the upper surface of the plate by the material entering 30 the recesses 7, an annular ring 10 has been formed on the lower surface of the plate by material entering the cavity 3, and spigots 11 have been formed by material entering the recesses 4. The characters 9 are securely held in 35 position by the material passing through the respective holes 1 and merging into the ring 10. The spigots 11 may be used for locating and/or securing the dial plate in position.

40 If desired, a decorative finish may be applied to the characters 9 by any known process such as the application of metal foil by a hot stamping or roller coating process, or a grain effect may be produced by finishing. The recesses 7 are shown in Figure 2 as being of the same dimensions, but it 45 is to be understood that, if desired, the dimensions can be varied to cause some of the characters 9 to be of different heights from other characters. This arrangement may be used, for example, to facilitate the application of different finishes to 50 different characters.

55 It will be seen that the sprue 12 remains attached to the ring 10, and this may be removed if required. However, in the case of a clock dial plate, the rear of the plate will normally not be 60 seen and, accordingly, this operation may be unnecessary.

## CLAIMS

1. A method of forming raised characters on a dial plate, wherein a hole is produced in the dial

65 plate at the location of each character, wherein the dial plate is placed in a mould having a plurality of cavities, each in the shape of a respective one of said characters, with one of said holes in register with each cavity, and wherein 70 synthetic resin material is injected through each of said holes into the respective cavity.

2. A method as claimed in Claim 1, wherein the mould is a two-part mould, one part being provided with said plurality of cavities, and the other part being provided with a groove which is adapted to carry the molten synthetic resin material from an inlet port to the various holes in the dial plate.

3. A method as claimed in Claim 2, wherein the 80 dial plate is a clock face, and wherein said groove is annular.

4. A method as claimed in any of the preceding Claims, wherein the dial plate is pre-finished before being inserted in the mould.

5. A method as claimed in any of the preceding Claims, wherein a finishing coating is applied to the formed characters after the plate has been removed from the mould.

6. A method as claimed in any of the preceding 90 Claims, wherein the depth of the cavities varies so that characters of different heights are produced.

7. A method as claimed in any of the preceding Claims, wherein the dial plate consists of metal stamped out of a metal strip, and wherein the 95 holes are pierced in the plate during stamping process.

8. A method as claimed in Claim 2 or Claim 3, wherein said other part of said two-part mould is provided with a plurality of recesses extending at 100 right angles to said groove and adapted to produce a plurality of spigots projecting from the face of the dial plate opposite to that on which the characters are formed.

9. A method of forming raised characters on a 105 dial plate substantially as hereinbefore described with reference to the accompanying diagrammatic drawings.

10. A dial plate having raised characters formed on one surface thereof by a method in accordance 110 with any of the preceding Claims, and a ring of synthetic resin material formed on the opposite surface thereof, the material of said characters merging into the material of said ring through holes in said dial plate.

11. Any features of novelty, taken singly or in combination, of the embodiments of the invention as hereinbefore described with reference to the accompanying diagrammatic drawings, or as described in Application No 12 153/78, the whole 115 of the disclosure of which is incorporated herein by this specific reference thereto.